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TITLE: COMPREHENSIVE ENVIRONMENTAL ASSESSMENT AND RESPONSE PROGRAM  
CONFIRMATION AND EVALUATION ACTIVITIES (2 copies)

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## **COMPREHENSIVE ENVIRONMENTAL ASSESSMENT AND RESPONSE PROGRAM CONFIRMATION AND EVALUATION ACTIVITIES**

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### **ABSTRACT**

The U.S. Department of Energy Albuquerque Operations Office (DOE-AL) initiated the Comprehensive Environmental Assessment and Response Program (CEARP) to identify, evaluate, and conduct remedial actions at hazardous waste disposal and contamination sites on the eight nuclear weapons development and production installations under its jurisdiction. The CEARP is being implemented in five phases (Phase 1--Installation Assessment, Phase 2--Confirmation, Phase 3--Technological Assessment, Phase 4--Remedial Action, and Phase 5--Compliance and Verification). During Phase 1, regulatory compliance was evaluated and disposal/contamination sites were identified. Phase 2 provides the field data for site characterization, risk assessment, determination of need for corrective action, and evaluation of possible remedial actions at hazardous waste sites. Phase 2 is being conducted in two stages (monitoring plan development/reconnaissance sampling and site characterization/remedial investigation). Problem sites across the DOE-AL complex were prioritized for site characterization and CEARP Phase 2 activities have been initiated.

### **INTRODUCTION**

To fulfill its obligations under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA), the U.S. Department of Energy Albuquerque Operations Office (DOE-AL) initiated a program to identify, evaluate, and conduct remedial actions at hazardous waste disposal and

contamination sites under its jurisdiction. The Comprehensive Environmental Assessment and Response Program (CEARP) is the DOE-AL implementation of the CERCLA program outlined for federal facilities by the U.S. Environmental Protection Agency (EPA). The CEARP is being implemented in five phases: Phase 1--Installation Assessment [regulatory compliance evaluation and site identification, inspection, preliminary assessment, and Hazard Ranking System (HRS) evaluation]; Phase 2--Confirmation (site characterization/remedial investigations); Phase 3--Technological Assessment (feasibility studies and remedial action selection); Phase 4--Remedial Action (remedial action design and implementation); and Phase 5--Compliance and Verification (site closeout and monitoring).

The CEARP addresses the eight nuclear weapons installations under DOE-AL. They include three research and development laboratories--Los Alamos National Laboratory (Los Alamos, New Mexico), Sandia National Laboratories-Albuquerque (Albuquerque, New Mexico) and Sandia National Laboratories-Livermore (Livermore, California), and five production plants--the Kansas City Plant (Kansas City, Missouri), Mound (Miamisburg, Ohio), the Pantex Plant (Amarillo, Texas), the Pinellas Plant (St. Petersburg, Florida), and the Rocky Flats Plant (Golden, Colorado). Implementation of the CEARP at the eight installations is being accomplished through the combined efforts of DOE-AL, Los Alamos National Laboratory, DOE Area Offices, the prime contractor at each facility, and subcontractors as appropriate.

## **PHASE 1 FINDINGS**

The CEARP Phase 1 Installation Assessment activities are nearing completion. The purpose of the Phase 1--Installation Assessment was twofold: (1) to evaluate current operations for compliance with environmental regulations, and (2) to identify/evaluate past and present potential hazardous waste disposal sites and contamination areas that may require remedial action under RCRA continuing release provisions or under CERCLA. During the CEARP Phase 1 evaluation, regulatory compliance issues were addressed and referred to DOE-AL and

the installation contractor for resolution. Potential CERCLA/RCRA sites were identified and assigned a positive, negative, or uncertain finding, as appropriate, for the following EPA CERCLA program elements: Federal Facility Site Discovery and Identification Findings (FFSDIF), Preliminary Assessment (PA), and Preliminary Site Inspection (PSI). No CERCLA findings were recorded for sites where past clean-up activities had been documented or current clean-up operations were in progress. Sites where remedial action had already been initiated were categorized as CEARP Phase 4, and sites where past remedial action was well documented will be verified under CEARP Phase 5.

Sites with negative findings (i.e., sites where no significant quantities of hazardous substances remain because of decay/decomposition/chemical reaction, or suspected sites where nothing could be found) were documented and eliminated from further evaluation. Sites were assigned an uncertain finding when the status of hazardous substances in the environment could not be determined from the records and insufficient information was available to conduct an HRS evaluation. Sites with uncertain findings will be further evaluated through reconnaissance sampling and follow-up during the supplementary stages of CEARP Phase 1. Based on the additional data, these sites will be scored using the EPA HRS and a risk assessment conducted to determine whether the sites should be targeted for CEARP Phase 2 site characterization and potential remedial action (CEARP Phases 3 and 4).

Sites with positive findings under CEARP Phase 1 were scored using the EPA HRS when sufficient information was available. Sites that received EPA HRS scores greater than the 28.5 threshold used by EPA for inclusion on the National Priorities List (NPL) are identified as CERCLA sites. These sites are being carried forward into CEARP Phase 2 for confirmation (site characterization/remedial investigation) and are being evaluated in accordance with the EPA CERCLA guidance for federal facilities. Sites that did not receive EPA HRS scores greater than 28.5, but may exceed DOE clean-up criteria, potentially present an environmental risk, or pose regulatory compliance concerns are also being carried forward for site

characterization and risk assessment under CEARP Phase 2. Sites with positive findings under CEARP Phase 1, but without sufficient information to be scored using the EPA HRS, are being further studied in the supplemental portion of CEARP Phase 1 to obtain the additional information needed for scoring.

During the CEARP Phase 1 activities conducted to date, more than 500 potential sites have been screened at the eight facilities. These sites range from employees recollections of minor spills of oil or hazardous materials to documented waste disposal sites containing hazardous chemical and/or radioactive wastes. All reported sites were listed and investigated. Many of the sites identified do not contain significant amounts of hazardous materials. However, all the sites with positive or uncertain findings, as indicated above, have been targeted for further evaluation. Approximately 130 sites have been or are planned to be carried forward into CEARP Phase 2 for site characterization/remedial investigation. Another 200 of these sites are being further evaluated under the supplementary CEARP Phase 1 reconnaissance and follow-up program to document the present conditions and determine if site characterization is appropriate.

Scoring of the potential CERCLA/RCRA sites using the EPA HRS indicated that only one of the DOE-AL installations, the Rocky Flats Plant, has any sites that exceed the EPA threshold for listing on the NPL. The sites with high scores at the Rocky Flats Plant have received priority consideration and are being evaluated in accordance with EPA CERCLA requirements.

Although a variety of sites were scored at the other seven installations, the scores received were significantly lower than the 28.5 NPL threshold. Preliminary evaluation of the sites with low scores has indicated that the EPA HRS is not adequate to determine the long-term potential for migration of contaminants from these sites and hence the need for remedial action. In addition, the scores cannot be used to rank relative priorities because the EPA HRS does not readily account for the differences in transport potential from the diverse

environments encountered in the CEARP investigations. Therefore, the EPA HRS scores have been used in the CEARP only to indicate a relative comparison between CEARP sites and other EPA high priority NPL sites.

Table 1 lists the DOE-AL installations and provides a brief summary of the principal functions, some of the special hazardous materials routinely handled, and materials which may potentially be found in the environment. Because of the unique testing conducted at both Sandia National Laboratories-Albuquerque and Los Alamos National Laboratory since the early days of nuclear weapons development, these installations contain a significant number of potentially contaminated firing sites (sites for test firing high-explosive configurations containing various heavy metals) in addition to waste disposal sites. The CEARP Phase 1 evaluation identified many of these sites for further site characterization. Migration potential and risk evaluations from these sites will be included as an important part of the successive CEARP activities.

## **PHASE 2 PURPOSE AND SCOPE**

The CEARP Phase 2 Confirmation activities provide the field data for site characterization, risk assessment, determination of the need for corrective action, and evaluation of possible remedial actions at hazardous waste sites. To accomplish this, the sites are characterized in sufficient detail to (1) determine the areal and vertical extent of contamination, (2) make a qualitative and quantitative determination of the spatial distribution of contaminants within the site, (3) evaluate the potential for migration of contaminants from the site, and (4) assess the risks to humans and the environment.

CEARP Phase 2 is being conducted in two steps: Phase 2A--Monitoring Plan development (i.e., reconnaissance sampling and development of plans for remedial investigations), and Phase 2B--Site Characterization (remedial investigations). Because the data collected during the CEARP Phase 2 site characterization activities provide the necessary information for

conducting the Phase 3 technology assessment (feasibility study), the CEARP Phase 2 site characterizations are being conducted in tandem with the CEARP Phase 3 technological assessments/feasibility studies.

## **PHASE 2 IMPLEMENTATION**

### **Phase 2A--Monitoring Plans**

Development of CEARP Phase 2A reconnaissance sampling and monitoring plans was initiated for the DOE-AL facilities during 1986. A three-tiered approach is being used in the development of the monitoring plans: (1) the CEARP Generic Monitoring Plan (CGMP), (2) Installation Generic Monitoring Plans (IGMP), and (3) Site-Specific Monitoring Plans (SSMP). The CGMP provides the generic policies and procedures that are being implemented at all the installations and at all the sites. An IGMP is being prepared for each DOE-AL installation. Each IGMP identifies sites targeted for remedial investigation at this time and provides installation-specific information that is being or will be incorporated into each of the SSMPs. An SSMP will be prepared for each planned remedial investigation. Individual remedial investigations are being conducted for individual sites or groupings of sites (combined because of proximity or similarities). Each tier of plans consists of a synopsis (introduction), sampling plan, health and safety plan, technical data management plan, and quality assurance/quality control plan.

At the SSMP level, the synopsis describes the known characteristics of the site, identifies possible remedial actions, and specifies the data needed to evaluate the migration potential and environmental risks and to select one of the alternative remedial actions. The SSMP sampling plans serve to guide the site characterization process through defining the objectives of the investigation, selecting a sampling approach, identifying sampling locations and the number and types of samples, specifying sample collection and analytical methods, and defining sampling logistics. The SSMP health and safety plans identify hazards and evaluate personnel risks,

stipulate personnel protection requirements, and provide contingency plans for dealing with specified emergencies. The SSMP technical data management plans provide procedures for storing, manipulating, retrieving, and archiving data collected during the site characterization. The SSMP quality assurance/quality control plans provide a description of the procedures for systematic control and cross-checking of all aspects of the data collection process, including the adequacy of the measurement or sampling program as well as laboratory controls addressing analytical accuracy and precision. Together, the plans provide relevant information similar to that provided in the Remedial Investigation Plans used by the EPA. The plans are being submitted to EPA and to the state authorities for review and comment before beginning the CEARP Phase 2B individual site characterization activities.

#### **Phase 2A--Reconnaissance Sampling**

Reconnaissance sampling is being conducted as part of the CEARP Phase 2A SSMP development process. The reconnaissance sampling program provides preliminary data as appropriate for better design of the SSMP sampling plans. The degree of reconnaissance sampling conducted depends on the information available for a specific site, and may include follow-up site inspections, geophysical surveys, direct measurements of radiation or contamination levels, and/or collection of samples for analysis.

The reconnaissance sampling program provides useful input to the development of the SSMPs and site characterization/remedial investigation activities. Because of limited historical records for many of the sites, follow-up site inspections, vegetation analysis, geophysical surveys (primarily ground penetrating radar and magnetometer), and aerial photography are being used to locate and map potential subsurface sites. Although site boundaries often cannot be clearly delineated from reconnaissance methods, the areal extent of the sites can be better defined for scoping the site characterization effort.

Because of the nature of the installations being investigated, the CEARP reconnaissance sampling program also provides useful information on the presence of pyrophoric metals (e.g., uranium) and/or high explosives/propellants that will require special consideration during the site characterization effort. In particular, the presence of pyrophorics/high explosives/propellants can limit both the investigation techniques and the equipment used during both reconnaissance and site characterization field investigations. If the site contains high explosives/propellants that could be pressure, shock, spark, or electrical impulse sensitive, the site may have to be sampled by remote operations. This could involve conducting geophysical surveys, drilling, or coring by remote control from protective bunkers or safe distances. These safety hazards are addressed in the SSMPs and are revised as additional information is collected at a site.

#### **Phase 2B--Site Characterization**

CEARP Phase 2B site characterization activities are being conducted on a priority basis across all DOE-AL installations. Sites are prioritized according to the following criteria: (1) sites where contamination levels could result in near term exposures to onsite personnel or the public; (2) sites judged to have significant potential for migration of contaminants offsite; or (3) sites that present regulatory concerns.

Major CEARP Phase 2B site characterizations have been initiated at several CEARP sites. Sites selected for initial characterization were chosen because of groundwater contamination problems or potential surface water migration pathways that could potentially result in offsite transport of contaminants. The site characterization activities are conducted in accordance with the program as outlined in the SSMPs.

Major geohydrological investigations have been initiated to evaluate the potential groundwater migration pathways at the Rocky Flats Plant, Mound, the Kansas City Plant, the Pinellas Plant, and Sandia National Laboratories-Livermore. These studies are designed to

characterize both the potential sources of contamination and the potential for transport within the interrelated groundwater and surface water systems. The studies include extensive field investigations and hydrological modeling as appropriate to determine compliance with water quality standards and to calculate risks.

## **CONCLUSION**

The DOE-AL CEARP Phase 1 has identified more than 300 waste disposal sites and/or contamination areas within the DOE-AL complex that will require further evaluation for potential environmental risk under CEARP Phase 1 reconnaissance and CEARP Phase 2 site characterization. The CEARP Phase 2 site characterization program is being implemented first at high priority sites and has made substantial progress in the collection of essential source term and environmental transport data. The CEARP has provided and will continue to provide valuable input to the DOE-AL and other regulatory agencies on environmental risks and the need for remedial actions at federal facilities under DOE-AL jurisdiction.

TABLE 1. DOE-AL INSTALLATIONS

<u>Installation</u>	<u>Function</u>	<u>Special Materials</u>	<u>Environmental Contaminants</u>
DOE-AL Weapons Production Facilities:			
Pinellas	microelectronics	tritium high explosives	organic solvents
Kansas City	macroelectronics foams, plastics, metals	none	PCBs organic solvents
Mound	detonators tritium components heat sources	high explosives tritium plutonium	tritium
Rocky Flats	metal fabrication	plutonium uranium beryllium	plutonium uranium organic solvents nitrates
Pantax	high explosives fabricating nuclear weapons assembly	high explosives ordnance	high explosives barium depleted uranium organic solvents oil
DOE-AL Weapons Research and Development Facilities:			
Sandia- Livermore	weapons engineering	tritium	none
Sandia- Albuquerque	weapons engineering and nonnuclear testing	high explosives rocket propellant radionuclides beryllium ordnance	high explosives propellant barium depleted uranium lead beryllium chromium
Los Alamos	weapons research and development nonnuclear testing materials research and development	high explosives radionuclides beryllium ordnance	high explosives barium plutonium uranium tritium cesium strontium organics heavy metals reactive metals oil